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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/626,006	07/24/2003	Mark B. Lyles	068351.0141	9914

31625 7590 03/21/2007  
BAKER BOTTS L.L.P.  
PATENT DEPARTMENT  
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AUSTIN, TX 78701-4039

EXAMINER
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FELTON, MICHAEL J

ART UNIT	PAPER NUMBER
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1731

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/21/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

## Office Action Summary

Application No.

10/626,006

Applicant(s)

LYLES, MARK B.

Examiner

Michael J. Felton

Art Unit

1731

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 29 December 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-5, 10-14 and 58-107 is/are pending in the application.
- 4a) Of the above claim(s) 66-107 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5, 10-14 and 58-65 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Response to Amendment*

The Pre-Appeal Panel has determined that prosecution should be reopened on this application, therefore, the finality of the previous action is withdrawn.

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1-4, 10-13, and 58-61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maillard et al. (US 6,866,045) in view of Rahn, et al., "Proton magnetic resonance studies of ultraviolet-irradiated apurinic acid," Nucleic Acids Res. 1974; 1(8): 999-1005 and "Mechanical properties of DNA", wikipedia.org, 3/14/2007. Maillard et al. disclose using more than 0.1% of DNA, RNA, or derivatives thereof, bound to a fiber, such as cellulose acetate in a cigarette filter. Maillard et al. do not

Art Unit: 1731

disclose using apurinic acid, the structural support that DNA and its derivatives give to the filter, the percentage of DNA, or its distribution within the filter.

However, Rahn et al., define apurinic acid as a derivative of DNA, saying, "Apurinic acid is a single-stranded polydeoxyribonucleotide (DNA) easily obtained upon depurination of DNA." Rahn et al. further explain that apurinic acid can function as a model system for studies of modified bases in DNA. It would have been obvious to one of ordinary skill in the art at the time of invention to use apurinic acid as an alternative to DNA. The motivation to use apurinic acid is that it is single stranded, so more surface will be exposed than if double stranded DNA was used.

It would also have been obvious that DNA or its derivatives, such as apurinic acid, would add structural support to a fibrous filter. Maillard et al. disclose using salmon DNA with about 2,000 base pairs. The DNA would be approximately, 6.6 micrometers long, 2 nm in diameter, and act as a rigid polymer. These attributes are inherent to DNA, and therefore DNA, of the length described in Maillard et al., would act as a structural element. (see wikipedia

[http://en.wikipedia.org/w/index.php?title=Mechanical\\_properties\\_of\\_DNA&oldid=108172803](http://en.wikipedia.org/w/index.php?title=Mechanical_properties_of_DNA&oldid=108172803) viewed on 3/14/2007)

It would also have been obvious that DNA or its derivatives, such as apurinic acid, would be uniformly distributed on the filtering surface. Maillard et al. disclose that the nucleic acids are bound to fibers, implying a uniform distribution of nucleic acids bound to fibers throughout the filter.

It is also obvious and notoriously well known that nucleic acids form crosslinking bonds with one another through hydrogen bonding of base pairs. In addition, Maillard et al. indicate that they bind their DNA or derivatives to the fibers of the filter. This meets the definition of crosslinking as defined by the applicant.

Claims 60 and 61 do not put forth details that distinguish them from the prior art in a patentable way, since they refer to method limitations and the claims are drawn to a product that is distinguished by its structure.

4. Claims 5 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maillard et al. (US 6,866,045), Rahn, et al., "Proton magnetic resonance studies of ultraviolet-irradiated apurinic acid," Nucleic Acids Res. 1974; 1(8): 999-1005 and "Mechanical properties of DNA", wikipedia.org, 3/12/2007, as applied to claims 1 and 10 above, in further view of admitted prior art. Maillard et al. disclose a cigarette filter containing more than 1% of DNA or DNA derivatives by weight. More than 1% includes the 80% claimed by the applicant. In addition, although one could argue that 80% is significantly more than 1%, the scope of these inventions is somewhat different. The instant application puts forth embodiments what would require longer filter life than the length of time of the use of one cigarette. For instance, a cigarette filter that is used for one month would require more active ingredient to react with smoke than a one-time use filter. A filter for a power an industrial smokestack would require multiple orders of magnitude more. These differences are admitted by the applicant; "it is assumed that

Art Unit: 1731

the life of a filter will be relatively longer with an increased amount of nucleic acid present. (page 9, line 8-9).

It would have been obvious to one of ordinary skill in the art at the time of invention to add more active ingredients to make filters that would last longer, as admitted by the applicant. The motivation to do so would have been to make a reusable or longer acting filter.

5. Claim 62-65 rejected under 35 U.S.C. 103(a) as being unpatentable over Maillard et al. (US 6,866,045), Rahn, et al., "Proton magnetic resonance studies of ultraviolet-irradiated apurinic acid," Nucleic Acids Res. 1974; 1(8): 999-1005 and "Mechanical properties of DNA", wikipedia.org, 3/14/2007, as applied to claims 1 and 10 above, in further view of Ness et al. (US 6,027,890). Maillard et al. disclose that the nucleic acid should be bound to a fiber such as cellulose acetate (col. 2, line 39). Maillard et al. do not disclose a method or compounds that can be used to attach nucleic acids to a substrate or the formation of a siloxane bridge.

However, Ness et al. disclose a way of attaching nucleic acids to a substrate using silica bifunctional coupling agents or silylated poly(ethylenimine). Although Ness et al. uses these compounds to attach nucleic acids to a substrate for making a microarray, it solves the same fundamental problem. It would have been obvious to one of ordinary skill in the art at the time of invention to use the attachment compounds used by Ness et al. to bind nucleic acids to fibers as described by Maillard et al. The

Art Unit: 1731

motivation to do so is supplied by Maillard et al, in the requirement for the nucleic acid to be bound to the filter substrate.

### **Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael J. Felton whose telephone number is 571-272-4805. The examiner can normally be reached on Monday to Friday, 7:30 AM to 4:30 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven P. Griffin can be reached on 571-272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MJF

  
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